(19) FEDERAL REPUBLIC OF GERMANY

GERMAN PATENT AND TRADEMARK OFFICE

(12) **German Utility Model**

(10) **DE 201 07 924 U1**

(51) Int. Cl.[7]: **C 12 C 13/02**

(21) Application No.: 201 07 924.0
(22) Filing Date: May 10, 2001
(47) Registration Date: December 12, 2001
(43) Date of Disclosure in Patent Bulletin: January 31, 2002

(56) Priority:
100 34 599.9 July 14, 2000

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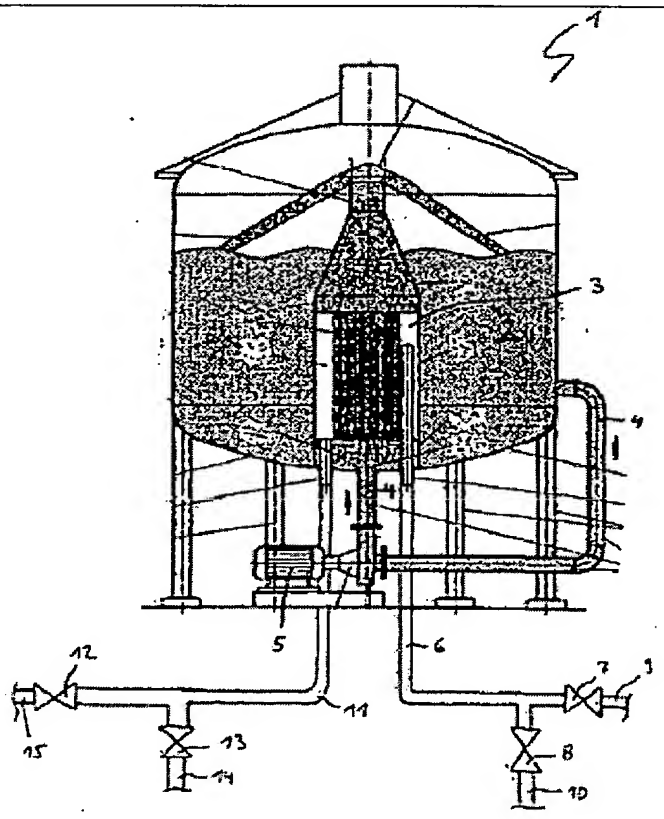
(54) **Device for Heating and Cooling Beer Wort**

(57) An installation or apparatus for producing beer, characterized in that a cooling unit (3) with which the beer wort (2) can be cooled in an intermediate step after cooking in a wort cooking apparatus (1), in particular in a wort boiler, and before the turn-out apparatus, in particular a whirlpool, is provided in the installation.



May 10, 2001

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HUP-041-GM
Ste/Ste

Device for Heating and Cooling Beer Wort

The present invention relates to a system or equipment for heating and cooling beer wort.

In the production of beer in breweries, the most important preproduct is the wort. During the brewing process, the wort is subjected to various temperature treatments in different process steps. In particular, the wort must be heated in wort cooking equipment, e.g., wort tanks during the brewing process, which serves in particular to evaporate water until achieving the desired amount of run of wort from the kettle. After cooking, the wort must be turned out in suitable run equipment, e.g., a whirlpool, to separate unwanted ingredients.

The object of the present invention is to propose a device with which the brewing process can be improved.

According to this invention an improvement in the brewing process is achieved by targeted cooling of the wort after boiling and before introducing it into the run equipment, e.g., in particular before introducing it into the whirlpool. In particular the wort should have a temperature in the range of 60°C to 110°C before being introduced into the whirlpool, but the temperature range from 80°C to 100°C has proven to be especially advantageous. However, wort temperatures above the boiling point of approximately 100°C require excess pressure equipment.

To perform this method, a brewery system and/or a brewing apparatus which has cooling equipment with which the wort can be cooled between cooking the wort and introducing it into the turn-out equipment is necessary. To do so, for example, a precooler or an intermediate cooler may be provided between the wort cooking device and the run device, in particular between the wort kettle and the whirlpool. Essentially, however, any heat exchange

device through which the hot wort can be passed after cooking and before turnout is suitable, so that thermal energy can be withdrawn from the wort in the heat exchanger by passing a cooling medium through it.

However, using additional preliminary coolers or intermediate coolers causes an additional equipment expense, which in turn increases the production cost of a brewery system and/or a brewing apparatus. It is therefore especially advantageous if the cooling device used to cool the wort after cooking and before the run is also a device that can be used for heating the wort, because ultimately any wort cooking device, i.e., in particular any wort kettle, is essentially a heat exchanger with which the thermal energy contained in a heating medium is transferred to the wort without requiring any mass exchange between the wort and the heating medium. It does not matter at all whether it is a wort cooking device having an internal cooker or an external cooker. Ultimately, wort cooking systems are essentially suitable for cooling the wort as well. Following the cooking of the wort, it is simply necessary to pass some other medium, namely a cooling medium such as ice water, through the heat exchanger of the wort cooking system to thereby cool the wort.

If this process is carried out in a wort cooking apparatus which is then an inventive wort cooking and cooling apparatus, then in a first process step the wort is heated in the wort cooking apparatus by introducing a heating medium into the heat exchanger and then in a subsequent second process step the wort is cooled by introducing a cooling medium into the heat exchanger. In other words this means that the wort is first heated to the desired temperature and optionally kept at this temperature for a certain period of time and then the medium introduced into the heat exchanger is switched from heating medium to cooling medium. Next the wort is cooled until it has reached the desired temperature, e.g., a temperature in the range of 85°C to 95°C, in particular a temperature of approximately 95°C. Only then is the wort drained out of the wort cooking and cooling apparatus and introduced into the turnout apparatus.

If the wort cooking apparatus is used at the same time as a cooling device, there is the special advantage that the method can also be carried out in existing installations, in particular without requiring any significant changes in the installations. In designing new installations, there are no significant additional costs because the equipment for cooling, in particular the

heat exchanger in the wort cooking apparatus and the equipment for performing the wort heating, must be provided anyway. As a result, in both cases, the only thing that must be provided is a few additional pipelines for supplying a cooling medium, e.g., ice water, which is available in a brewery anyway, and also a few additional valves for switching between heating medium and cooling medium.

If certain temperature profiles are necessary in heating and/or cooling the wort, through the use of suitable mixing equipment it is possible at any time to supply the heat exchanger with a medium having a certain mixed temperature. This is always especially advantageous when the heating and/or cooling medium is available in the brewery only at a certain predetermined temperature, e.g., a temperature of superheated steam and/or ice water.

As already described above, wort cooking equipment having an internal cooker as well as wort cooking equipment having an external cooker may optionally be used for optional heating and cooling of the wort. It should be pointed out that in this case the use of a circulating system to circulate the wort in the wort cooking equipment is advantageous in the case of wort cooking equipment having internal cookers because the density differences that occur in cooling the wort are not enough in most cases to ensure circulation of the wort in the wort cooking equipment, so that forced circulation by means of a circulating system allows more effective cooling.

The present invention is explained in greater detail below on the basis of a drawing which shows only one exemplary embodiment of the present invention.

Figure 1 shows an inventive device for optional heating or cooling of wort, shown in cross section.

Figure 1 shows a schematic diagram of a wort cooking apparatus 1 which is designed in the manner of a wort boiler or kettle which forms part of a brewery installation for producing beer. The pipelines and fittings which belong to this wort boiler 1 are shown here only inasmuch as they are necessary to facilitate an understanding of the invention. The pipelines through which the wort 2 can be introduced into and removed from the wort cooking equipment 1 are not shown in Figure 1. A heat exchanger 3 is arranged at the center of the

wort boiler 1 and may be designed, for example, in the manner of a conventional internal boiler, e.g., as a tubular boiler. The wort 2 can be circulated in the wort cooking apparatus 1 through a pipeline 4 and a circulating pump 5.

Depending on the setting of the valves 7 and 8, a heating medium, e.g., superheated steam, may be fed from the pipeline 9 through the pipeline 6 or a cooling medium, e.g., ice water may be fed from the pipeline 10 into the pipeline 6 and thus into the heat exchanger 3. The heating and/or cooling medium passed through the heat exchanger 3 may be drained out of the heat exchanger through the pipeline 11, in which case the valves 12 and 13 are adjusted, depending on whether a heating medium or cooling has just been passed through the heat exchanger 3, so that depending on the valve setting, the heating medium, e.g., the condensate, that has been cooled in the heat exchanger can be removed through the pipeline 15 or the cooling medium that has been heated in the heat exchanger can be removed through the pipeline 14. The heating and/or cooling medium may thus be pumped in circulation systems suitable for this purpose and then heated and/or cooled again in appropriate equipment.

Figure 1 shows a combined wort cooking and cooling apparatus with internal cooker and/or coolers, i.e., with a heat exchanger unit situated inside the wort cooking and cooling apparatus. It is self-evident that the optional heating and cooling of the wort may also be performed with a wort cooking and cooling apparatus using an external cooker and/or external cooler, i.e., with a heat exchanger mounted outside the wort cooking and cooling apparatus. This requires only that incoming lines be provided on a conventional external cooker, for example, so that a heating medium and/or a cooling medium can be optionally supplied and removed.

12.05.01

10. Mai 2001

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HUP-041-GM
Ste/Ste

Claims

1. An installation or apparatus for producing beer, characterized in that a cooling apparatus (3) is provided in the installation so that the wort (2) can be cooled in an intermediate step after being cooked in a wort cooker apparatus (1), in particular in a wort boiler or kettle, and before the turnout in a turnout apparatus, in particular in a whirlpool.

2. Installation or apparatus according to Claim 1, characterized in that the cooling apparatus (3) is designed in the manner of a heat exchanger installed in the wort cooking apparatus through which a cooling medium can flow.

3. Installation or apparatus according to Claim 2, characterized in that a cooling medium for cooling the wort and a heating medium for heating the wort may optionally flow through the heat exchanger (3).

4. Installation or apparatus according to Claim 3, characterized in that the heat exchanger (2) is part of a conventional internal or external cooker, whereby lines (6, 9, 10, 11, 14, 15) and valves (7, 8, 12, 13) are connected to the internal or external cooker for optionally passing a cooling medium for cooling the wort (2) through the system and the heating medium for heating the wort (2).

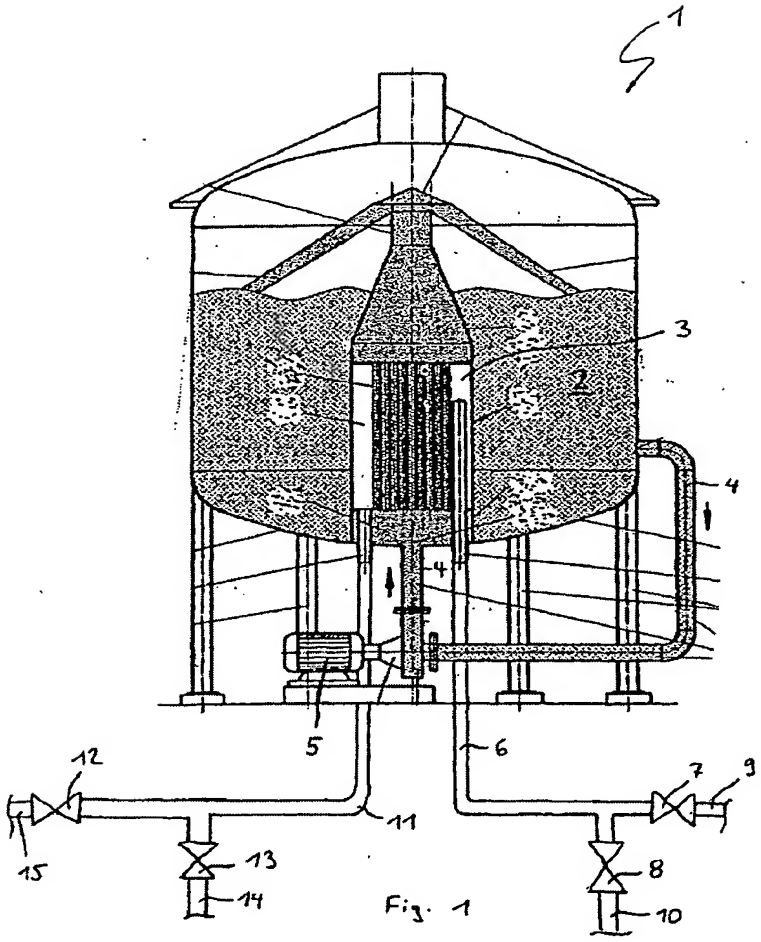

Fig. 1

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Figure 1